Calculus Warm Up #6-1

1. Find any horizontal asymptotes for the function.

$$f(x) = \frac{-6x}{\sqrt{4x^2 + 5}}$$

HW Questions: p. 188

In Exercises 9–24. find the indicated limit

9. $\lim_{x \to \infty} \frac{2x - 1}{3x + 2}$

13. $\lim_{x \to -\infty} \frac{5x^2}{x + 3}$

17. $\lim_{x \to -\infty} \left(\frac{2x}{x - 1} + \frac{3x}{x + 1} \right)$

$\lim_{x \to -\infty} \left(\frac{\frac{2x}{x}}{\frac{x}{x} - \frac{1}{x}} \right) + \lim_{x \to -\infty} \left(\frac{\frac{3x}{x}}{\frac{x}{x} + \frac{1}{x}} \right)$

$\lim_{x \to \infty} \left(\frac{2}{1 - \frac{1}{x}} \right) + \lim_{x \to -\infty} \frac{3}{1 + \frac{1}{x}}$

$2 + 3$

5

21. $\lim_{x \to \infty} \frac{2x + 1}{\sqrt{x^2 - x}}$

In Exercises 25–28, find the indicated limit. [Hint: Treat the expression as a fraction whose denominator is 1, and rationalize the numerator.]

25. $\lim_{x \to -\infty} (x + \sqrt{x^2 + 3})$

$$\frac{(x + \sqrt{x^2+3})}{1} \cdot \frac{(x - \sqrt{x^2+3})}{(x - \sqrt{x^2+3})}$$

$$\lim_{x \to -\infty} \frac{x^2 - (x^2+3)}{x - \sqrt{x^2+3}}$$

$$\lim_{x \to -\infty} \frac{\frac{-3}{-x}}{\frac{x}{-x} - \sqrt{\frac{x^2}{x^2} + \frac{3}{x^2}}}$$

$$\lim_{x \to -\infty} \frac{\frac{3}{x}}{-1 - \sqrt{1 + \frac{3}{x^2}}}$$

$$= \frac{0}{-1-1}$$

$$= 0 \quad !!$$

27) $\lim_{x \to \infty}$

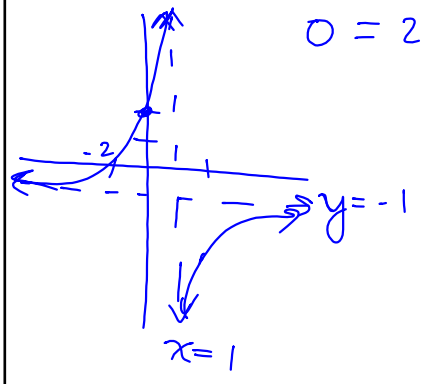
$$\frac{(x - \sqrt{x^2+x})}{1} \cdot \frac{x + \sqrt{x^2+x}}{x + \sqrt{x^2+x}}$$

$$\lim_{x \to \infty} \frac{x^2 - (x^2+x)}{x + \sqrt{x^2+x}}$$

$$\lim_{x \to \infty} \frac{-x}{\quad}$$

In Exercises 29–40, sketch the graph of the given equation. As a sketching aid, examine each equation for intercepts, symmetry, and asymptotes.

29. $y = \dfrac{2 + x}{1 - x}$ $\quad \dfrac{4}{-1}$



$0 = 2 + x$

$\lim_{x \to \infty} \dfrac{\frac{2}{x} + \frac{x}{x}}{\frac{1}{x} - \frac{x}{x}}$

$\lim_{x \to \infty} \dfrac{\frac{2}{x} + 1}{\frac{1}{x} - 1}$

$y = -1$

Classwork (Green WS)

Applications of the Derivative

HW: Review 4.1 - 4.4 (Pink)

(answers follow)

(Tuesday HW Quiz pgs. 166, 173, 180, 188)

Quiz: 4.1 - 4.4, Tuesday
Extrema on open and closed intervals
Mean Value Theorem
Increasing/decreasing intervals (1st deriv. test)
Concavity & 2nd deriv. test

Answers to pink review:

1. Min @ $(0,0)$
Max @ $(-1,\frac{1}{4})$ & $(1,\frac{1}{4})$

2. $-\frac{1}{c^2} = \frac{f(2)-f(\frac{1}{2})}{2-\frac{1}{2}}$
$\vdots$
$c = \pm 1$, but only $\boxed{c=1}$ on $[\frac{1}{2}, 2]$

3. $c = \frac{2}{\sqrt{3}}$

4. Critical #: $x=-4$
f decreases $(-\infty,-4)$
f increases $(-4,\infty)$
Min @ $(-4,-6)$

5. f decreasing on $(-\infty, \frac{3}{2})$
f increasing on $(\frac{3}{2}, \infty)$
Min @ $(\frac{3}{2}, -\frac{27}{16})$

6. Max $(0,5)$
PI $(3,-13)$
Min $(6,-31)$

7a) No for ii, others yes

b) PI $(\frac{1}{2}, \frac{3}{2})$